

REMARKS

Entry of the foregoing, reexamination and reconsideration of the subject application are respectfully requested in light of the amendments above and the comments which follow.

As correctly noted in the Office Action Summary, claims 1-13 were pending. By the present response, claims 1, 5, 7, 9 and 13 have been amended, claim 10 canceled, and claims 14-21 have been added. Thus, upon entry of the present response, claims 1-9 and 11-21 remain pending and await further consideration on the merits.

Support for the foregoing amendments can be found, for example, in at least the following locations in the original disclosure: the original claims

CLAIM REJECTIONS UNDER 35 U.S.C. §103

Claims 1-7 stand rejected under 35 U.S.C. §103(a) as being unpatentable over JP 63107073 to Koshiro (hereafter "*Koshiro*") or JP 01105581 to Yasuo (hereafter "*Yasuo*") in combination with U.S. Patent No. 4,255,208 to Deutscher et al. (hereafter "*Deutscher et al.*") on the grounds set forth on page 2 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

Presently amended Claim 1, the only independent claim at issue here, incorporates some of the features of previously presented Claim 10. Claim 10 was not included in this rejection. Therefore, the present Claim 1 distinguishes over the cited references for at least the same reason as prior Claim 10. Because the rejection has been obviated, withdrawal is respectfully requested.

Claims 1-13 stand rejected under 35 U.S.C. §103(a) as being unpatentable over the publication by Basol et al. (hereafter "*Basol et al.*") in combination with *Deutscher et al.* on the grounds set forth on page 3 of the Official Action. These rejections should be withdrawn because the proposed modification renders one or the other references unsuitable for its intended purpose and also a prima facie case of obviousness has not been established.

The present claims of the application are directed to a method to produce a solar cell. As recited in Claim 1, the method includes, *inter alia*:

on a substrate a dissolvable intermediate layer is deposited, on the intermediate layer a layer structure is deposited, the intermediate layer is dissolved subsequently, which separates the layer structure from the substrate, and thereby from the layer structure a flexible solar cell is formed, wherein said solar cell has an absorber layer consisting of a material of the group of I-III-VI compounds of the periodic system or a material of the group of II-VI compounds of the periodic system.

Basol et al. discloses forming a thin film CuInSe_2 solar cell on a flexible polyimide substrate, such as a KAPTON™ 50 μm sheet. See Abstract and Section 2, page 94. The disclosed device has a back contact layer of Mo deposited on the polyimide. A CIS layer and a CdS/ZnO layer are deposited on the Mo layer (see Fig. 1). The purpose of the *Basol et al.* device is to form a high efficiency CIS solar cell on an insulating, light-weight and flexible polymeric substrate." See, page 94, lines 14-16.

Deutscher et al. discloses epitaxially growing on a silicon or sapphire substrate a 1 to 1.5 μm layer of dissolvable material, such as sodium fluoride, sodium chloride or silver. Epitaxial growth of the dissolvable material occurs under vacuum at temperatures ranging from room temperature (example 1) to 350°C

(example 3 and 6). A layer of semiconductor is then vacuum evaporated at 350°C (example 3) to 700°C (example 2) onto the layer of dissolvable material.

First, the combination of *Basol et al.* and *Deutscher et al.* is improper as a basis for the obviousness rejection because the proposed modification renders one or the other cited references unsatisfactory for its intended purpose. For example, if the method of *Deutscher et al.* were to be applied to the layers on polyimide support of *Basol et al.*, then the structure of *Basol et al.*, would no longer have the polyimide support on which the structure of *Basol et al.* is formed and would be incapable of functioning as intended.

The MPEP notes that a combination of references resulting in a prior art reference being unsatisfactory for its intended purpose is improper. See, MPEP §2143.01. Here, the combination proposed by the Examiner would result in the flexible solar cell of *Basol et al.* not having the polyimide support.

The combination of *Deutscher et al.* and *Basol et al.* is improper because the modification proposed by the Examiner changes the principle of operation of the *Basol et al.* reference to the extent that it is incapable of performing its intended function. The Official Action accurately admits that the disclosure in *Basol et al.* does not teach "forming resin layer and subsequent formation of solar cell on a substrate coated with water dissolvable sodium chloride." See page 3, lines 11-13. The Official Action then relies upon the disclosure in *Deutscher et al.* The Official Action proposes forming "thin resin layer on a substrate coated with water dissolvable intermediate layer in the invention of *Basol et al.* as an alternative to formation of solar cell directly on resin substrate." However, such a proposed modification results in a final product of *Basol et al.* having no substrate.

As disclosed, *Basol et al.* forms the solar cell structure on polyimide. The Official Action appears to propose substituting the substrate coated with water dissolvable intermediate layer of *Deutscher et al.* for the polyimide layer of *Basol et al.* As such, when the intermediate layer is subsequently dissolved, there would be no supporting substrate for the solar cell of *Basol et al.* However, the substrate of *Basol et al.* provides insulation properties to the Mo back contact layer of the solar cell device. Constructing the structure in *Basol et al.* with the dissolving layer method of *Deutscher et al.* as proposed would leave the Mo back contact layer exposed. Such a construction would make the structure susceptible to failure, e.g., short circuits or environmental degradation. Thus, since the proposed modification or combination of the prior art would render it not suitable for its intended use, then the teachings of the reference are insufficient to render the claims *prima facie* obvious. See, MPEP §2143.01. Accordingly, applicants respectfully request the withdrawal of this rejection.

Second, to establish a *prima facie* case of obviousness, three criteria must be met including establishing a suggestion or motivation to modify the reference or to combine the teachings, establishing a reasonable expectation of success for the proposed modification or combination, and showing that the references teach or suggest all of the claimed features. See, MPEP §2142-43. Here, the rejection is deficient in that the references have not been shown to teach or suggest motivation to modify the reference or to combine the teachings has not been established.

For example, the proposed modification is directly against the stated purpose of *Basol et al.*, which is to form a high efficiency CIS solar cell on an insulating, light-weight and flexible polymeric substrate." See, page 94, lines 14-16.

Further, it is asserted on page 3 of the Official Action that:

It would have been obvious to one of ordinary skill in the art to form thin resin layer on a substrate coated with water dissolvable intermediate layer in the invention of Basol et al. as an alternative to formation of solar cell directly on resin substrate having thickness of 50 microns, so that final solar cell would form[ed] on very thin flexible resin layer and such solar cells formed on thin resin layer is very flexible and would be applied in several areas such as narrow or curved surfaces for electric power generation.

This ground of rejection is respectfully traversed. The above-stated ground of rejection is deficient in that it fails to state the requisite degree of motivation as to why one of ordinary skill in the art would have been motivated to modify the teachings of *Basol et al.* in the manner proposed. Moreover, it is clear that the stated motivation for modifying the teachings of *Basol et al.* has not been derived from the prior art, but rather from the applicants' own disclosure.

For example, if *Basol et al.* used a 50 μm polyimide flexible substrate on which to form his layered structure, why would one of ordinary skill in the art look to remove and/or replace the polyimide substrate by use of a dissolvable coating as disclosed in *Deutscher et al.*? Further, the difficulties of making cells on polyimide substrates are more challenging than epitaxial growth as disclosed by *Deutscher et al.* for reasons of the thermophysical properties of the substrate and the solar cell active layers. So it is not clear that one of ordinary skill in the art would look to these two distinct methods as interchangeable.

From the above, it is respectfully asserted that no motivation for the proposed combination has been established. Rather, the rejection is based upon impermissible hindsight and should be withdrawn.

For at least the above-noted reasons, the rejection is improper and should be withdrawn.

Further and with respect to Claims 5 and 16, neither *Basol et al.* nor *Deutscher et al.*, either alone or in combination, disclose, teach or suggest the use of an alkali-halogenide (Claim 5), such as NaCl or NaF (see, Claim 16) as the intermediate layer. Also, neither of these cited documents, alone or in combination, disclose, teach or suggest a method by which the efficiency is improved by diffusion of alkali ion through the supporting layer so that the alkali ion is incorporated in the II-VI and I-III-VI compounds during growth. For at least these further reasons, Claims 5 and 16 distinguish over the cited references. Withdrawal of the rejection of these claims is respectfully requested.

The remaining claims depend directly or indirectly from Claim 1 and are therefore improperly rejected over the combination of disclosures in *Basol et al.* and *Deutscher et al.* for at least the same reasons as discussed above with respect to independent Claim 1. Withdrawal of the rejection of these claims is respectfully requested.

NEW CLAIMS

New Claims 14-21 have been added reciting, in individual claims, features that were previously presented in combination in original claims. These claims

distinguish over the cited references for at least the same reasons as discussed above with respect to independent Claim 1.

CONCLUSION

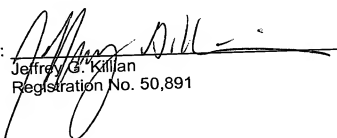
From the foregoing, further and favorable action in the form of a Notice of Allowance is earnestly solicited. Should the Examiner feel that any issues remain, it is requested that the undersigned be contacted so that any such issues may be adequately addressed and prosecution of the instant application expedited.

Respectfully submitted,

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